

1 What is claimed is:

1 1. In a disk drive control system comprising a micro-controller, a micro-
2 controller cache system having a plurality of line-cache segments grouped into at least one
3 line-cache segment-group, and a buffer manager communicating with the micro-controller
4 cache system and a remote memory, a method for reducing micro-controller access time to
5 information stored in the remote memory via the buffer manager, the method comprising:

6 receiving in the micro-controller cache system a current data-request from
7 the micro-controller;

8 providing the current requested data to the micro-controller if the current
9 requested data resides in a first line-cache segment of a first segment-group; and

10 automatically filling a second line-cache segment of the first segment-group
11 with data retrieved from the remote memory wherein the retrieved data is sequential
12 in the remote memory to the provided current requested data.

1 2. The method of claim 1, wherein the automatically filling further comprises:

2 filling the second line-cache segment if the second line-cache segment
3 hosted a most-recently requested data prior to the current requested data.

1 3. The method of claim 2, wherein the automatically filling further comprises:

2 filling the second line-cache segment if the current requested data is
3 sequential to the most-recently requested data.

1 4. The method of claim 1, wherein the retrieved data comprises a burst of
2 data in the range of 32 to 64 bytes.

1 5. The method of claim 1, wherein the plurality of line-cache segments are
2 grouped into a plurality of line-cache segment-groups.

1 6. The method of claim 5, further comprising:

2 selecting a line-cache segment-group if the current requested data does not
3 reside in the plurality of line-cache segment-groups;

4 filling a first line-cache segment of the selected line-cache segment-group
5 with a first set of data from the remote memory location wherein the first set of data
6 comprises the current requested data;

7 providing the current requested data to the micro-controller from the filled
8 first line-cache segment; and
9 filling a second line-cache segment of the selected line-cache segment-group
10 with a second set of data from the remote memory location wherein the second set
11 of data is sequential in the remote memory to the first set of data.

1 7. The method of claim 6, wherein the selected line-cache segment-group is a
2 least recently used line-cache segment-group.

1 8. The method of claim 6, wherein the first set of data comprises a first burst
2 of data in the range of 32 to 64 bytes.

1 9. The method of claim 6, wherein the second set of data comprises a second
2 burst of data in the range of 32 to 64 bytes.

1 10. The method of claim 1, wherein the line-cache segment-group comprises
2 two line-cache segments.

1 11. The method of claim 1, wherein the remote memory comprises a dynamic
2 random access memory (DRAM).

1 12. The method of claim 1, wherein the buffer manager is in communication
2 with a plurality of control system clients and provides client-requested data to the clients
3 from the remote memory.

1 13. The method of claim 12, wherein the plurality of control system clients
2 comprises at least one of a disk subsystem, an error correction code subsystem, and a
3 host interface subsystem.

1 14. A disk drive control system comprising a micro-controller, a micro-
2 controller cache system having a plurality of line-cache segments grouped into at least
3 one line-cache segment-group, and a buffer manager communicating with the micro-
4 controller cache system and a remote memory, the disk drive control system
5 comprising:

6 the micro-controller cache system is adapted to: a) receive a current data-
7 request from the micro-controller, b) provide the current requested data to the
8 micro-controller if the current requested data resides in a first line-cache segment
9 of a first segment-group, and c) automatically fill a second line-cache segment of
10 the first segment-group with data retrieved from the remote memory wherein the
11 retrieved data is sequential in the remote memory to the provided current
12 requested data.

1 15. The disk drive control system of claim 14, wherein the micro-controller
2 cache system automatically fills the second line-cache segment if the second line-cache
3 segment hosted a most-recently requested data prior to the current requested data.

1 16. The disk drive control system of claim 15, wherein the micro-controller
2 cache system automatically fills the second line-cache segment if the current requested data
3 is sequential to the most-recently requested data.

1 17. The disk drive control system of claim 14, wherein the plurality of line-
2 cache segments are grouped into a plurality of line-cache segment-groups.

1 18. The disk drive control system of claim 17, wherein the micro-controller
2 cache system is further adapted to a) select a line-cache segment-group if the current
3 requested data does not reside in the plurality of line-cache segment-groups; b) fill a first
4 line-cache segment of the selected line-cache segment-group with a first set of data from
5 the remote memory location wherein the first set of data comprises the current requested
6 data; c) provide the current requested data to the micro-controller from the filled first line-
7 cache segment; and d) fill a second line-cache segment of the selected line-cache segment-
8 group with a second set of data from the remote memory location wherein the second set of
9 data is sequential in the remote memory to the first set of data.

1 19. The disk drive control system of claim 18, wherein the selected line-cache
2 segment-group is a least recently used line-cache segment-group.

1 20. The disk drive control system of claim 19, wherein the line-cache
2 segment-group comprises two line-cache segments.